9.1 Drainage Watersheds

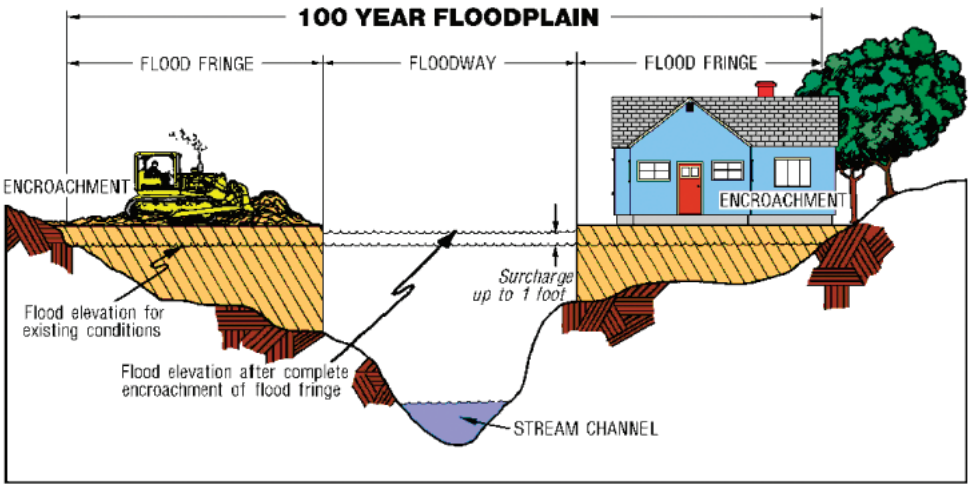
The City of Bryan has maintained and advanced a stormwater management program to address drainage and flooding issues within several of the City's watersheds. Watershed is a term used to describe the geographic area of land that contributes stormwater runoff to a particular river or stream. Some of the watersheds contained within Bryan include:

- Carters Creek
- Turkey Creek
- Thompsons Creek
- Hudson Creek
- Burton Creek
- Briar Creek
- Cottonwood Branch
- Still Creek

Within each watershed, there are areas, usually near a river or stream, where potential flood hazards exist. These areas are often identified as "floodplains" on maps approved by the Federal Emergency Management Agency (FEMA). The most notable floodplain is the 100-year floodplain, also known as the base flood, that is shown on the community's Flood Insurance Rate Maps (FIRMs) . Flood Insurance Rate Maps (FIRMs) are published by FEMA and used by the insurance industry to determine flood insurance rates for homeowners based on the location of their property in relation to the floodplain. The 100-year floodplain is defined as an area which has a one percent chance of flooding in any given year. Typically, a floodplain has two components: a "floodway" and a "floodway fringe". FEMA defines the floodway as the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without increasing the water surface elevation more than one foot if the entire area was filled up to the floodway limit. In general, the floodway includes the channel and surrounding areas where flooding is deeper and faster moving than in the outer areas of the floodplain. In many communities, including the City of Bryan, the floodway is considered the limit of developable floodplain area.

Figure 9-1

100 Year Floodplain Graphic



Source: www.techsolv.com/360/floodp.htm.

Located on both sides of the channel, between a floodway and a 100-year floodplain boundary, is the floodway fringe. This is an area of land which may be "reclaimed" for development if specific City of Bryan and FEMA requirements are met. These requirements include development permits and requests to revise official FEMA floodplain maps. These map revisions may take place in the form of Letters of Map Revision based on physical changes (LOMR) or based on fill (LOMR-F) and Letters of Map Amendment (LOMA).

The LOMR and LOMR-F are submitted to FEMA on the grounds that either a physical change has been made, such as the placement of fill (LOMR-F) or the construction of a bridge or modification of a channel (LOMR), or alternatively, that a new study has been completed based on updated information for the watershed. A LOMA is submitted to FEMA in the case that a property has been inadvertently mapped in the floodplain but is actually on high ground and out of the floodplain.

Both the LOMR and LOMA officially amend the effective FIRM panel. In each case, FEMA determines if a proposed map revision or amendment is appropriate and would be responsible for effecting a map change. However, the City of Bryan has the ultimate authority to approve or deny proposed floodplain reclamation within its corporate limits. In some areas where no floodplains or approximate floodplains exist, an analysis could be required to determine the limits of the floodplain, floodway, and the associated flood elevations. Usually, a floodplain determination is triggered if a development adjacent to a waterway exceeds either five lots or fifty acres.

9.2 Stormwater Management Ordinance

Through the destruction of hurricanes Katrina and Rita in 2005, many homeowners in the Gulf Coast region learned that homeowner's insurance does not cover damage to structures caused by flooding. FEMA as well as other groups such as the Association of State Floodplain Managers (ASFPM) and the Texas Floodplain Managers Association (TFMA) continue to emphasize the importance of flood insurance, especially for property owners whose properties are located in a floodplain.

In 1987, the City of Bryan adopted a Stormwater Management Ordinance with the purpose of protecting the public health, safety and general welfare, and specifically, minimizing public harm and private losses due to flooding conditions. The Stormwater Management Ordinance gives the City of Bryan the authority to require that the impacts that developments have on the drainage patterns be addressed. This ordinance directs the development community to meet the requirements of the drainage design guidelines, which address topics such as inlet and pipe sizing, detention design, and requirements for development in floodplains, among other things.

The ordinance contains the necessary provisions regarding development in the floodplain to make Bryan an eligible community under FEMA's National Flood Insurance Program (NFIP). This designation gives the citizens of Bryan the opportunity to obtain flood insurance through the NFIP. The ability to purchase this insurance is reserved for communities that adopt and enforce a Stormwater Management Ordinance in compliance with FEMA regulations. The measures that have been taken by the City of Bryan through the Stormwater Management Ordinance and the drainage design guidelines have enabled Bryan to participate in the Community Rating System (CRS) program. This program examines the measures that a community is taking to protect its citizens from flooding and gives discounts on flood insurance based on those measures. Currently, Bryan residents can receive a 5% discount on flood insurance; however, Bryan is currently taking steps to increase that to 15% by the spring of 2007.

9.3 Financing Drainage Improvements

In the fall of 1997, the City of Bryan implemented a drainage utility fee intended to help identify and fund drainage capital improvement projects. The fee is collected from Bryan residents with the monthly city utility bill. The funds collected to date have been used for watershed studies to determine floodplain locations, identify possible drainage improvements and to correct flooding problems within the watershed. The use of these funds has helped the City assess drainage problems throughout the drainage basins and prioritize potential solutions. The use of these funds has now shifted from watershed studies to the construction of drainage improvements to remedy existing problems.

The current program of identifying, prioritizing and then constructing necessary improvements appears to be working effectively. The City should continue the drainage utility fee to help provide the needed resources for necessary drainage improvements as well as future watershed studies.

9.4 Drainage Accomplishments

The following action statements from the 1999 Bryan Comprehensive Plan addressing stormwater and drainage issues have been accomplished:

- Engineering studies of Hudson Creek, Briar Creek, Burton Creek, Thompsons Branch, and Turkey Creek are complete. A comprehensive study of Carters Creek is nearing completion. Cottonwood Branch, Still Creek and Thompsons Creek will be completed in the near future.
- Establishment of a permanent long-term fee structure to fund maintenance and drainage master planning has been accomplished.
- Establishment of a maintenance program to address drainage problems and maintenance concerns for smaller facilities such as neighborhood detention ponds and swales. Maintenance of these facilities is critical because a lack of proper maintenance may lead to overgrowth and a build-up of sediments, which could drastically reduce the effectiveness of these facilities.
- Implementation of a policy that ensures appropriate uses of floodplain areas through sound floodplain management policies and regulatory requirements. Preserve natural floodplain resources to enhance the overall appearance of the City.
- Completion of a storm sewer master plan. The mapping of existing storm sewers has been completed and a list of capital improvements has been generated to help guide future drainage projects.

In addition, common stormwater design guidelines are currently being reviewed by both Bryan and College Station public works departments and area consulting engineers. These updated design and materials criteria will aid in the construction and long-term maintenance of area drainage facilities.

9.5 Stormwater Quality

Stormwater quality is a relatively new concern in drainage planning and design. It is becoming increasingly important to consider the impacts of "non-point source pollution", generated by both development and maintenance of current facilities, on natural waterways and wildlife. Non-point source pollution consists of contaminants picked up by stormwater runoff along both natural and man-made drainage paths, as opposed to pollutants that are discharged at a single location, such as an industrial plant.

In 1990, concerns over the increasing impact of non-point source pollution resulted in the implementation of Phase I of the National Pollutant Discharge Elimination System (NPDES) by the Environmental Protection Agency (EPA). NPDES regulates Municipal Separate Storm Sewer Systems (MS4s) for communities with a population of 100,000 or greater. MS4s include any pipe, ditch or stream used for carrying storm water.

In November 1999, the EPA promulgated Phase II of its NPDES program, which regulates municipalities and other MS4 operators with a population of less than 100,000. In addition, Phase II regulates construction sites of less than 5 acres in size, which were exempt under Phase I. Phase II is intended to further reduce adverse impacts on water quality and aquatic habitat by instituting the use of controls on unregulated sources of storm water discharges that have the greatest likelihood of causing continued environmental degradation. In order to come into compliance with NPDES Phase II, the City of Bryan will be required to meet the following requirements:

- Develop, implement, and enforce a stormwater management program designed to reduce the discharge of non-point source pollutants from the MS4 to the "maximum extent practicable" to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act.
- The storm water management program must include the following six minimum control measures: public education and outreach; public participation/ involvement; illicit discharge detection and elimination; construction site runoff control; post-construction runoff control; and pollution prevention/good housekeeping.
- The program must identify the City's selection of Best Management Practices and measurable goals for each minimum measure in the permit application.

Each state is responsible for creating and administering the general permits for NPDES Phase II. In Texas, the responsible regulatory agency is the Texas Commission on Environmental Quality (TCEQ). Despite the implementation of Phase II by the EPA in 1999, the State of Texas has yet to issue a general permit for MS4s. It is still unclear when the general permit will be issued as the Texas Pollutant Discharge Elimination System (TPDES) program was met with resistance in the Texas Legislature and is facing legal challenges that have delayed its release.

While recent breakthroughs regarding the issuance of the Phase II industrial permitting have recently transpired, there is no indication when MS4 permits will be issued in Texas. TCEQ has stated that once the industrial permits were issued, comments on the draft permit would be addressed and the MS4 general permits would be included in the State Register. Under the draft permit language, a City must obtain permit coverage within 90 days of permit issuance and must fully implement a stormwater management program by the end of the first permit term, typically a 5-year period.

In 2003, the City of Bryan completed the Stormwater Modeling and Infrastructure Mapping Project effectively accomplishing one of the most time-consuming and expensive steps in meeting the upcoming NPDES requirements. This project mapped the City's drainage system and identified areas with drainage problems. With the successful completion of this and other projects, the City of Bryan is well on its way to developing a comprehensive management program for its urban stormwater runoff in compliance with federal standards.

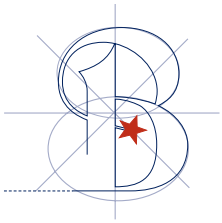
9.6 Goals, Objectives and Action Statements

The following goals, objectives and action statements concerning drainage were developed during this Comprehensive Plan Update.

GOAL #1: Minimize losses due to flooding and achieve a balance between natural open space and improvements for drainage.

Objective A: Address stormwater and drainage issues.

Action Statement 1	Utilize the dedication of a buffer zone to reduce the loss of floodplains and to minimize flood damage caused by erosion.
Action Statement 2	Provide development incentives to assure the control and management of floodplains.
Action Statement 3:	Consider purchasing floodways and floodplains in order to assure proper drainage in a pleasing and accessible environment.
Action Statement 4:	Continue to allow the dedication of some floodplain acreage toward parkland.
Action Statement 5	Develop and fund a comprehensive Capital Improvements Program from the recommended improvements identified in the 2003 Thompson's Storm Sewer Master Plan as well those identified in each Watershed Master Plan.
Action Statement 6:	Evaluate streets designated as emergency routes to identify where bridge or culvert size over creeks should be improved to assure access as evacuation or emergency services routes during major storm events.



Objective B: Promote a regional stormwater detention system to assure coordination and lessen mutual impacts.

Action Statement 1: Promote regional detention facilities and provide opportunities for their creation. Incorporate design guidelines encouraging the provision of regional detention facilities where they could be beneficial.

Action Statement 2: Explore reimbursement methods to help pay for regional detention facilities.